RIGOL

Quick Guide

DG1000 Series

Dual-Channel Function / Arbitrary Waveform Generator

Aug. 2012
RIGOL Technologies, Inc.

Guaranty and Declaration

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Publication Number

QGB06105-1110

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RIGOL guarantees this product conforms to the national and industrial standards in China as well as the ISO9001:2008 standard and the ISO14001:2004 standard. Other international standard conformance certification is in progress.

Contact Us

If you have any problem or requirement when using our products, please contact **RIGOL** Technologies, Inc. or your local distributors, or visit: www.rigol.com.

Safety Notices

Please review the following safety precautions carefully so as to avoid any personal injuries or damages to the instrument and any product connected to it. To prevent potential hazards, please use the instrument only specified by this manual.

Use Proper Power Cord

Only the power cord designed for the instrument and authorized by local country could be used.

Ground the Instrument

The instrument is grounded through the Protective Earth lead of the power cord. To avoid electric shock, it is essential to connect the earth terminal of power cord to the Protective Earth terminal before any inputs or outputs.

Observe all Terminal Ratings

To avoid fire or shock hazard, observe all ratings and markers on the instrument and check your manual for more information about ratings before connecting.

Do Not Operate Without Covers

Do not operate the instrument with covers or panels removed.

Use Proper Fuse

Please use the specified fuses.

Avoid Circuit or Wire Exposure

Do not touch exposed junctions and components when the unit is powered.

Do Not Operate With Suspected Failures

If you suspect damage occurs to the instrument, please do a inspection by **RIGOL** authorized personnel.

Keep Well Ventilation

Inadequate ventilation may cause increasing of

temperature or damages to the device. So please keep well ventilated and inspect the intake and fan regularly.

Do Not Operate in Wet Conditions

In order to avoid short circuiting to the interior of the device or electric shock, please do not operate in a humid environment.

Do Not Operate in an Explosive Atmosphere

In order to avoid damages to the device or personal injuries, it is important to operate the device away from an explosive atmosphere.

Keep Product Surfaces Clean and Dry

To avoid the influence of dust and/or moisture in air, please keep the surface of device clean and dry.

Safety Terms and Symbols

Terms in this Manual. These terms may appear in this manual:

WARNING
Warning statements indicate the conditions or practices that could result in injury or loss of life.

CAUTION
Caution statements indicate the conditions or practices that could result in damage to this product or other property.

Terms on the Product. These terms may appear on the product:

DANGER	indicates an injury or hazard that may immediately happen.
WARNING	indicates a potential injury or hazard that may immediately happen.
CAUTION	indicates a potential damage to the instrument or other property may occur.

Symbols on the Product. These symbols may appear on the product:

Hazardous Voltage

Refer to Instructions

Protective Earth Terminal

Chassis Ground

Test Ground

Document Overview

This manual is used to guide users to quickly understand the DG1000 series Function/Arbitrary Waveform Generator.

Topics in this manual:

- Primary Inspection
- Handle Adjustment
- Device Connection
- User Interface
- Quick Start
- Care and Cleaning

DG1000 series Function/Arbitrary Waveform Generator includes DG1022 and DG1022A. In this manual, DG1022 is taken as an example to introduce the using method of the generator.

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Primary Inspection

General Inspection

1. **Inspect the shipping container for damage.**
   Keep the damaged shipping container or cushioning material until the contents of the shipment have been checked for completeness and the instrument has passed both electrical and mechanical tests.

   The consigner or carrier shall be liable for the damage to instrument resulting from shipment. **RIGOL** would not be responsible for free maintenance/rework or replacement of the unit.

2. **Inspect the instrument.**
   The front/rear panel are shown as follows. In case of any damage, or defect, or failure, notify your **RIGOL** Sales Representative.

3. **Check the accessories.**
   The standard accessories supplied with the instrument are listed as follows. If your contents are incomplete or damaged, please notify your **RIGOL** Sales Representative.

Instrument Inspection

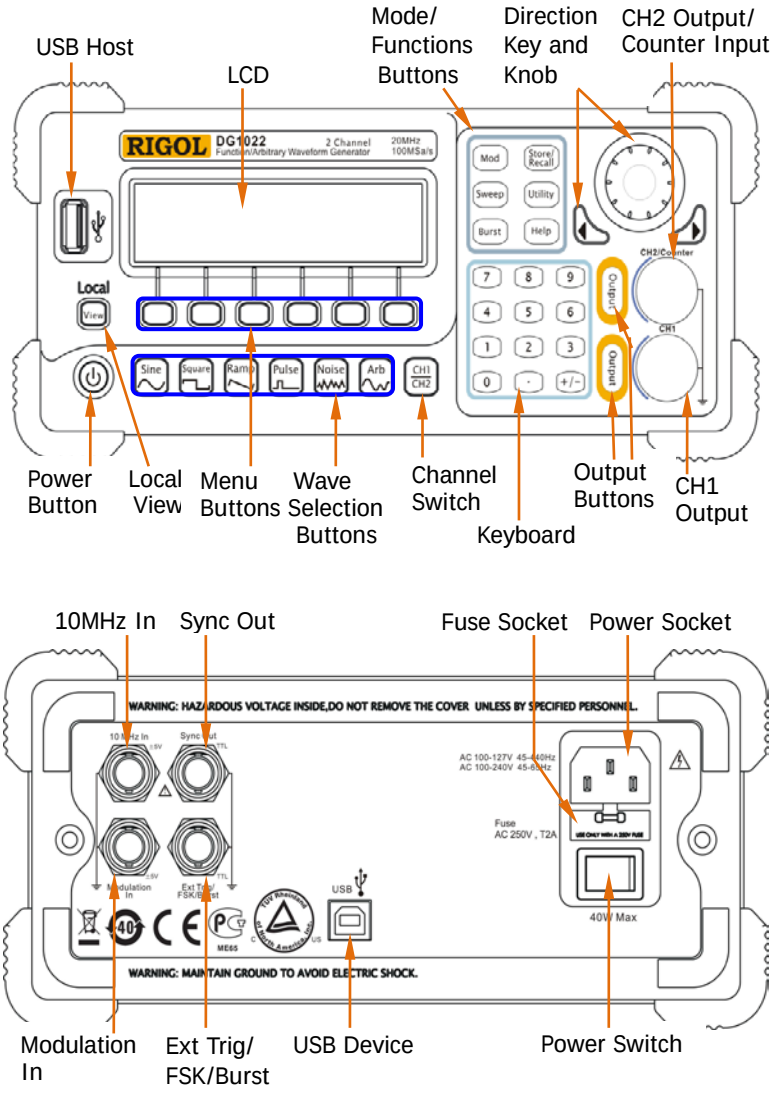
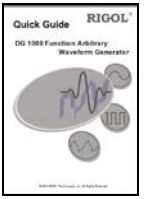


Figure 1 Front and rear panel overview

Accessories Inspection

1. Standard Accessories

A Power Cord



A Quick Guide

A CD*

Note*: The CD includes an User's Guide and application software.

2. Optional Accessories

40 dB Attenuator

Power Amplifier

BNC Cable

BNC-Alligator Clip Cable

USB Cable

Note: Pictures above are for a reference merely, the actual items may be different.

Handle Adjustment

Adjust the handle of DG1000 to make the instrument locate in a stable and best observation position.

Adjustment Method: Grip the handle by the sides and pull it outward. Then, take it rotate to the desired position.

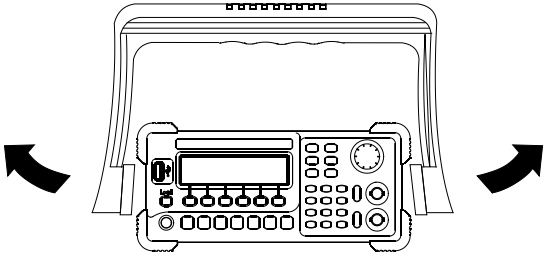


Figure 2 Method of handle adjustment

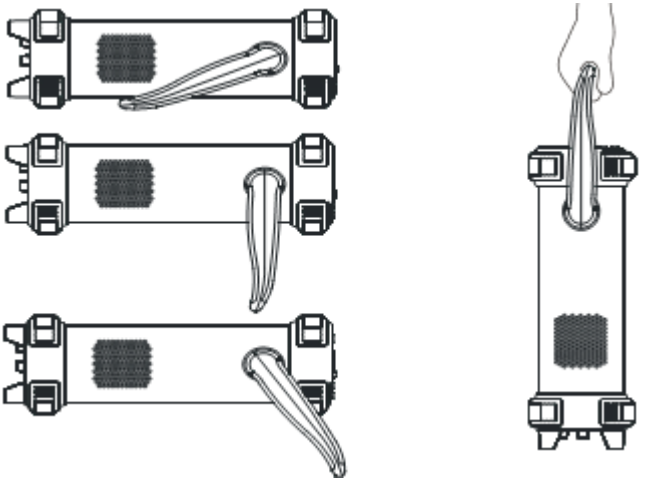


Figure 3 Horizontal and movable positions

Device Connection

Power Connection

Connect the power socket and AC with power cord attached to the instrument.

Turn on the power switch at the rear panel to power on DG1000, therewithal, the power button on the front panel will be lighted and flashing on and off alternatively. Press it to start the instrument immediately.

If start abnormally, please check according to the following steps:

1. Check if the power cord is normally connected and the power switch on the rear panel has been turned on.
2. Check if the fuse is intact, or esle please replace it.
3. If the instrument still cannot be started, contact **RIGOL** for help.

USB Connection

USB Host:

This port is used to transfer data when external USB device connects to the generator regarded as a “Host” device. For example, connect a USB flash device for data storage.

USB Device:

This port is used to transfer data when external USB device connects to the generator regarded as a “Slave” device. For example, connect with PC for remote control.

BNC Connection

Connectors need to be connected by BNC Cable include: “CH2/ Counter” connector (refer to Figure 14) at the front panel, “10MHz In”, “Sync Out”, “Modulation In” and “Ext Trig/FSK/Burst” at the rear panel. Insert BNC cable to the conector vertically and rotate the BNC connector clockwise to lock it.

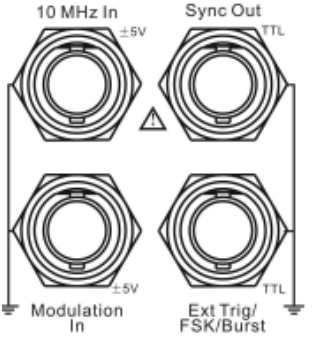
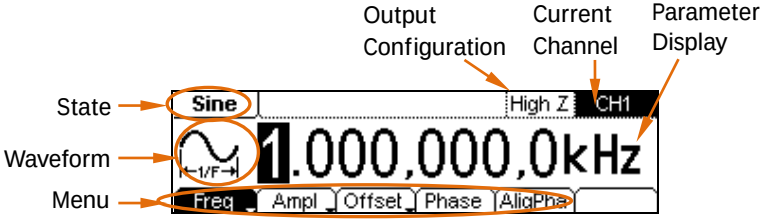


Figure 4 BNC interfaces on the rear panel

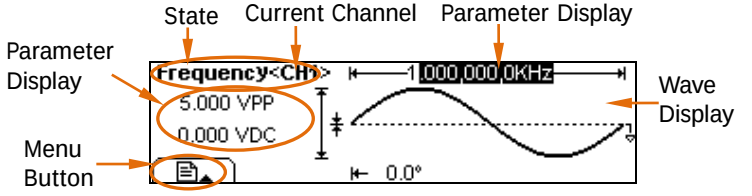
User Interface

DG1000 offers three display modes, which can be switched by View button on the front panel.

Menu Mode (Single Channel)



Graph Mode (Single Channel)



Menu Mode (Dual Channels)

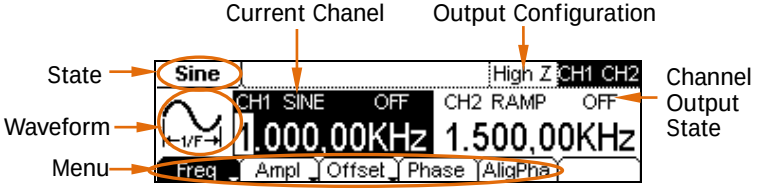


Figure 5 User interface

Quick Start

Waveform Settings

DG1000 can generate Basic, Arbitrary, Modulated, Sweep and Burst Waveforms.

1. Basic/Arbitrary Waveform Settings

The instrument is available to output 5 kinds of basic waveforms: Sine, Square, Ramp, Pulse and Noise. Besides, it has 48 kinds of built-in arbitrary waveforms and provides 10 nonvolatile storage positions to store arbitrary waveforms defined by users.

Figure 6 Buttons for selecting Basic/Arbitrary waveforms

Press a button above to enter waveform setting interface. Different waveform has different parameters.

E.g. Press → DtyCyc to set "Duty Cycle" parameter in the way mentioned in "Parameter Input" section.

Figure 7 Parameters setting interface

Setting methods of other waveforms are the same as the example above. All the parameters permitted to be set are listed in the following table.

Table 1 Parameters of basic/arbitrary waveforms

Waveforms	Parameters
Sine	Frequency/Period, Amplitude/High Level, Offset/Low Level, Phase
Square	Frequency/Period, Amplitude/High Level, Offset/Low Level, Duty Cycle, Phase
Ramp	Frequency/Period, Amplitude/High Level, Offset/Low Level, Symmetry, Phase
Pulse	Frequency/Period, Amplitude/High Level, Offset/Low Level, Width/Duty Cycle, Delay
Noise	Amplitude/High Level, Offset/Low Level,
Arbitrary	Frequency/Period, Amplitude/High Level, Offset/Low Level, Phase

2. Modulated Waveform Settings

CH1 of DG1000 can generate AM, FM, FSK and PM waveforms. Press Mod → Type to select the modulation type from "AM/FM/FSK/PM" and enter the setting interface.

E.g. Press Mod → Type→AM to enter the AM setting interface:

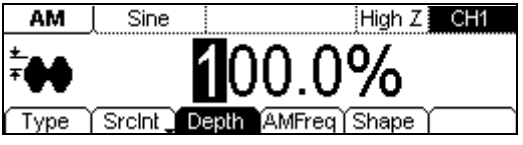


Figure 8 AM setting interface under menu display

Press View to switch the interface to graph mode:

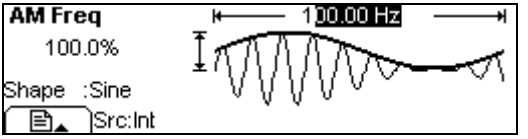


Figure 9 AM setting interface under graph display

Setting method of other waveforms are the same as the example above. All the parameters permitted to be set are listed in the following table.

Table 2 Parameters of modulated waveforms

Types	Parameters
AM	Type (AM), SrcInt (Depth, AMFreq, Shape)/ SrcExt
FM	Type (FM), SrcInt (Deviat., FMFreq, Shape)/ SrcExt (Deviat.)
FSK	Type (FSK), SrcInt (HopFreq, FSK Rate)/ SrcExt (HopFreq)
PM	Type (PM), SrcInt (Deviat., PMFreq, Shape)/ SrcExt (Deviat.)

3. Sweep Waveform Settings

In frequency sweep mode, sweep waveforms could be generated and outputted from the start frequency to the stop frequency during specified time by CH1 of DG1000. Sine, Square, Ramp or Arbitrary (without DC) waveform can be used to generate sweep waveforms, except for pulse and noise.

Press Sweep to enter sweep waveform setting interface as follows. Thereinto, parameters as Linear/log, Start/Center, Stop/Span, Time and Trigger are allowed to be set.

Figure 10 Sweep waveform setting interface

4. Burst Waveform Settings

Various burst waveforms can be generated by CH1 of DG1000 in burst mode.

Press Burst to enter the setting interface. Parameters as Cycles/Infinite, Phase, Period, Delay and Trigger are allowed to be set in N-Cycle mode; while Polarity and Phase are available in Gated mode.

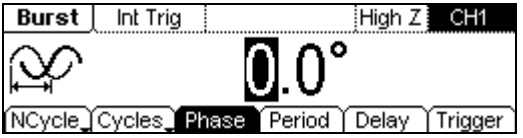


Figure 11 Burst waveform setting interface

Parameter Input

To input parameters, you need to use the direction keys and knob, in connection with the numeric keyboard on the front panel.

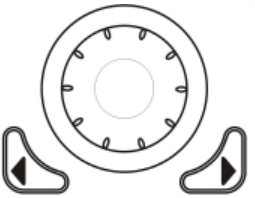


Figure 12 Direction keys and knob

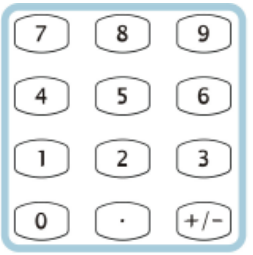


Figure 13 Keyboard

Direction Keys

Switch the digital of a numerical value or the storage position of arbitrary waveform/setting files.

Knob

- Change the numerical value. Rotate clockwise to increase and counterclockwise to decrease.
- Switch the types of built-in waveforms, storage location of arbitrary waveform/setting files, and the letter when input a file name.

Keyboard

Directly input numerical value to change parameters.

Output Setting

The two yellow buttons located at the right of front panel shown as follows are for controlling the channels output and counter input:

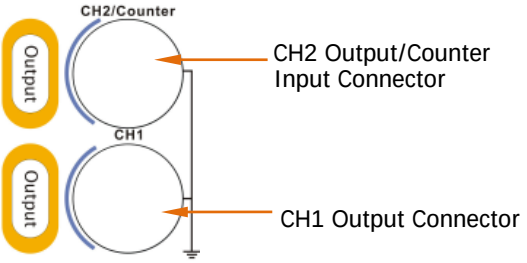


Figure 14 Channel /Counter Connector

Channels output

- Connect the connector shown above with an external device by BNC cable.
- Press the corresponding "Output" button to start channel outputting. Meanwhile, the backlight of "Output" button turns on and a "ON" sign appears in user interface. To turn off the channel output, press "Output" again.

Counter Input

The counter enables to measure frequency (100mHz~200MHz), period, duty cycle and positive/negative pulse width of a input signal.

- Press Utility → Count to enter the counter mode, meanwhile, the "Output" button of CH2 is turned off and channel output is closed automatically.
- Connect the generator with external device by BNC cable, so as to input external signal into the counter.

Store and Recall

In order to store, recall or delete arbitrary waveform/setting files in DG1000 or USB storage device, please use the Store/Recall function.

Press Store/Recall to enter Store/Recall setting interface:

Figure 15 Store/Recall setting interface

Table 3 Parameters under the store and recall function

Parameters	settings	Explanations
Disk	Local UDisk (When USB flash device is connected)	Switch the storage path
Type	State Data All	10 setting files 10 waveform files All types of file
Recall		Read the State/Data file in specified location
Store		Save the State/Data file to specified location
Remove		Delete the specified file that has been stored in the memory

Utility System

Press Utility to enter utility system setting interface.

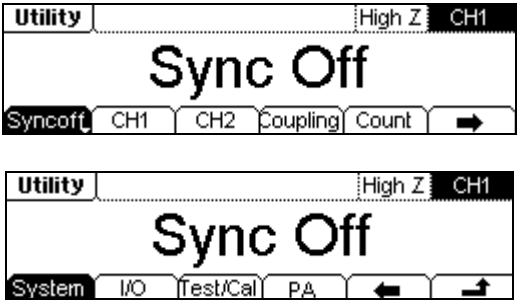


Figure 16 Utility system setting interface

Table 4 Parameters of utility system

Parameters	Explanations
Sync On Sync Off	Enable/disable the Sync Signal of CH1 through the [Sync Out] connector on the rear panel.
CH1	Basic setting of CH1
CH2	Basic setting of CH2
Coupling	Coupling settings of dual channels
Count	Turn on the counter to observe the measurement results and set corresponding parameters.
System	Set the language, screen display, beeper, screen saver, format and system configuration.
I/O	View USB Information
Test/Cal	Do self-test and calibration operation or view the instrument information.
PA	Setup power amplifier.

Help System

With built-in help system, users can get information for every button on the front panel by pressing corresponding button for a few time.

In addition, press Help to enter the help topics for common operations and information of RIGOL Technology Support.

1.View the last message display
2.View the remote command error queue
3.Get HELP on any key
4.Generate a modulated waveform
Select

Figure 17 Help information interface

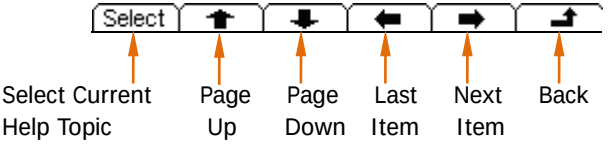


Figure 18 The whole menus

The help topics include:

1. View the last message display
2. View the remote command error queue
3. Get HELP on any key
4. Generate a modulated Waveform
5. Create an arbitrary waveform
6. Generate DC signal
7. Reset the instrument
8. RIGOL Technology Support

Care and Cleaning

General Maintenance

Do not store or leave the instrument in where it will be exposed to direct sunlight for long periods of time.

Caution

To avoid damages to the instrument, do not expose it to liquids which have causticity.

Cleaning

Clean the instrument according to the actual situation. To clean the exterior surface, perform the following steps:

1. Disconnect the instrument from all power sources.
2. Clean the loose dust on the surface of the instrument with a lint- free cloth (with a mild detergent and water). When clean the LCD, take care to avoid scarifying it.

WARNING

To avoid injury resulting from short circuit, make sure the instrument is completely dry before reconnecting into a power source.